

(Dr. Omori); *Russia* (General Pomerantzeff, Prof. Lewitzky, Dr. Wosnesjenskij); *Switzerland* (Prof. Forel, Prof. Riggenbach). Among these thirty-five members there were sixteen official delegates for the different States, as follows:—*Austria-Hungary*, 1; *Belgium*, 1; *Germany*, 9; *Japan*, 1; *Russia*, 2; *Switzerland*, 2.

The principal object of the conference was the establishment of an international seismological union. After some discussion the *projet* of statutes of an "International Seismological Association," formed principally in imitation of the statutes of the International Catalogue Association and of the International Geodetic Association, was unanimously accepted by the conference, the chief points being as follows:—

§ 1. The object of the Association is the advancement of knowledge of all the seismological problems, which can be solved only by the cooperation of numerous seismological observatories all over the world. As the principal means of attaining this object are proposed:—(1) seismological observations according to fixed plans; (2) experiments on certain important seismological questions; (3) establishment and support of seismological stations in certain countries which need assistance from the Association; (4) organisation of a central bureau for collection and discussion of the reports from various countries.

§ 3. The parts of the Association are:—(1) general meeting; (2) permanent commission; (3) central bureau.

§ 5. The permanent commission consists of the director of the central bureau and of one member from each of the States which compose the Association. . . .

§ 8. Each State must duly communicate to the central bureau, through its local central bureau, the results of seismic observations and experiments.

§ 9. Each State must contribute to the central bureau a certain yearly sum of money, to be fixed in proportion to the number of the inhabitants. The sum thus contributed by the different States is to be appropriated to the following purposes:—(1) publications and administration; (2) remuneration to the general secretary; (3) support of those who work in special important seismological investigations; (4) support of those seismological observatories which are established by the Association. The distribution of the sum into these various items is to be decided by the permanent commission.

As to the seismological observations, experiments and publications in the different States, the latter have a perfect freedom. The choice of the instruments is also left free to each State. The statutes of the Association having been thus adopted by the conference, the further steps for the formation of the Association are now to be taken by the Imperial German Government through diplomatic channels.

As there is still one year or so before the Association can be actually formed, it was proposed by Prof. Helmert to establish a provisional central bureau and let the latter begin at once the function for the international seismological investigation, under the cooperation of all the members present, who approved the proposal and promised to send in publications and reports. Prof. Forel proposed, in the name of all the non-German members to select the Strassburg Seismological Observatory as the provisional central bureau, under the direction of Prof. Gerland. This proposal was accepted, the Association being thus provisionally formed. Besides the establishment of the statutes, there were given by Prof. Helmert and others a series of valuable reports and lectures on observational as well as theoretical seismology.

The first international seismological conference proved to be a very satisfactory one. The full minutes of the transactions are expected to be published shortly. F. OMORI.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

DR. R. T. HEWLETT, of the Jenner Institute of Preventive Medicine, has been appointed professor of general pathology and bacteriology at King's College, London.

THE following candidates have passed the D.Sc. examination of the University of London:—Mathematics and Physics, J. Buchanan; Experimental Physics, C. V. Drysdale, W. H. Eccles, P. E. Shaw; Chemistry, T. J. Baker, T. A. Henry, W. H. Hurlley, G. D. Lander, H. R. Le Sueur, S. Smiles.

NO. 1657, VOL. 64]

THE following regulation from the new Calendar of the Imperial University at Kyoto show that the Japanese are encouraging scientific research among University students:—"In June and December every year each student shall report to the director of the College, through his professor, the state and progress of research which he has made in his study of special subject; and the director shall submit such report to the Faculty meeting for examination. When a student has completed the work of research at the University Hall, he shall prepare a record of his career at the University and present it to the president of the University, through his professor." Progress is bound to be made where education is carried on in this spirit.

SCIENTIFIC SERIAL.

Bulletin of the American Mathematical Society, July.—Surfaces whose first and second fundamental forms are the second and first respectively of another surface, by Dr. Eisenhart, was read at the February meeting. The results arrived at are—the ruled surfaces, defined by the equations

$$y + \mu x = \sqrt{1 + \mu^2} + C_1 \mu + C_1 \\ z - ix \sqrt{1 + \mu^2} = \mu + C_1 \sqrt{1 + \mu^2} + C_3,$$

are the only surfaces whose first and second fundamental forms can be taken for the second and first fundamental forms of a surface. Further, the second surface is only the first to a translation *près*. And of these surfaces the only real one is the sphere of radius unity—the C's, as usual, are arbitrary constants. References are given to work by Bianchi, Casorati, Monge and Forsyth.—On the groups generated by two operators, by Dr. G. A. Miller, was read at the April meeting. This short note, which gives several references, discusses the theorem, "every group that is generated by two operators of order two is a dihedral rotation group, and every dihedral rotation group is generated by two operators of order two."—Mr. G. Peirce gives a curious approximate construction for π , read at the same meeting. This is as neat a construction as we can remember.—Non-Euclidean geometry is a short notice, by J. L. Coolidge, of a work with this title by Dr. H. P. Manning.—J. K. Whittemore gives an extended abstract of "Vorlesungen über Differentialgeometrie" (pp. xvi + 659), a translation of Bianchi's work by M. Lukat.—Notes, new publications, tenth annual list of papers (read before the Society, with references to their places of publication), and a full index close the number and the volume.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 20.—"Further Observations on Nova Persei. No. 3." By Sir Norman Lockyer, K.C.B., F.R.S.

In a former paper an account was given of the observations of the Nova, made at Kensington between March 5 and March 25 inclusive. The observations are now brought up to midnight of May 7. Between March 25 and the latter date, estimates of the magnitude of the Nova have been made on thirty-three evenings, visual observations of the spectrum on twenty-five evenings, and photographs of the spectrum on six evenings.

The 10-inch refractor with a McClean spectroscope has generally been used for eye observations. The 6-inch prismatic camera has not been available for photographing the spectrum owing to the faintness of the Nova, but photographs have been secured by Dr. Lockyer with the 30-inch reflector on the nights of March 27, April 1 and 12, and by Mr. Fowler on March 26 and April 4. With the 9-inch prismatic reflector the spectrum was photographed by Mr. Hodgson on March 30, April 1 and 4.

Change of Brightness.—Since March 25 the magnitude of the Nova has been undergoing further periodic variations, and although observations have not been made on every night since that date, owing to unfavourable weather, yet sufficient data have been gathered to enable a general idea of the light changes to be obtained, and the few gaps can be filled up later by other observers who experienced clearer skies on these occasions.

A table is given containing observations for magnitude made from March 26 to May 5 inclusive.

brighter), and a line in the yellow which recent measures show to be D_3 .

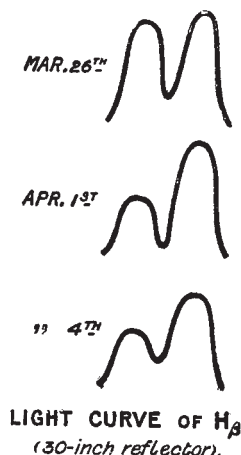
The strong lines in the green at $\lambda\lambda$ 4924, 5019, 5169 and 5317, which occurred in the earlier photographs and which were ascribed to iron, are either absent from the later photographs or appear only as very weak lines.

It has been noted that the lines 447, 501 and D_3 appear to vary with the magnitude of the star, becoming relatively more prominent towards a minimum.

The continuous spectrum has been described throughout as "weak" or "very weak."

On the evening of April 25 Messrs. Fowler and Butler made comparisons of the Nova spectrum with the spectra of hydrogen, helium, and that furnished by an air spark between poles of iron and zinc. For this purpose a Hilger two-prism star spectro-scope was used with the 10-inch refractor. The hydrogen line F and the helium line D_3 were found to be sensibly coincident with Nova lines. The middle of the strong green line, previously mentioned as λ 501, practically coincided with the nitrogen line 5005.7, and therefore there is little doubt that it is identical with the chief nebular line λ 5007.6. This line was also compared with the asterium line at λ 5015.7, but was found to be decidedly non-coincident with it, though of sufficient breadth to nearly reach it.

Photographic Spectrum.—In so far as the number and positions of the lines are concerned, the few photographs available for discussion were obtained in the early part of the period dealt with in the present paper (March 26 to May 7), and show a



spectrum very similar to that of March 25, which was described in detail in the last paper. The chief lines shown in the photographs are $H\beta$, $H\gamma$, $H\delta$, $H\epsilon$ and $H\zeta$, together with 4471 and 4650.

Characteristics of $H\beta$.—In continuation of the series of light curves of $H\beta$ reproduced in the last paper, I give those plotted by Mr. Baxandall from the later photographs.

It will be seen that the line $H\beta$ still shows two maxima of intensity. As recorded in the previous paper, the less refrangible component gave indications of becoming brighter than the more refrangible member. These further photographs indicate that by April 4 the less refrangible had become twice as intense.

"Total Eclipse of the Sun, May 28, 1900.—Account of the Observations made by the Solar Physics Observatory Eclipse Expedition and the Officers and Men of H.M.S. *Thetis* at Santa Pola, Spain." By Sir Norman Lockyer, K.C.B., F.R.S.

The Report gives details as to the erection of coronagraphs, prismatic cameras and other instruments, and of the results obtained by their use during the eclipse, which was observed under very favourable circumstances. Some of the more obvious results have already been stated in a Preliminary Report (*Roy. Soc. Proc.*, vol. lxvii. p. 341), and the following remarks may now be added.

A comparison of the photographs taken with the coronagraph of 16 feet focus with those taken about two hours earlier in America indicates that while some of the prominences changed

greatly in appearance in the interval, no changes were detected in the details of the corona.

The spectrum of the chromosphere, as photographed with the prismatic cameras, so greatly resembles that of 1898 that it has not been considered necessary to make a complete reduction of wave-lengths. The prominences visible during totality had comparatively simple spectra, the greatest number of lines recorded being thirty-six.

The heights above the photosphere to which many of the vapours can be traced in the photographs are tabulated and compared with the results obtained in 1898; the two sets of figures are sufficiently accordant, except in the case of the shorter arcs, the value 475 miles derived for the lowest measurable vapours in 1898 being represented in 1900 by two strata, one reaching to 700 miles and the other to 270 miles above the photosphere.

The bright line spectrum of the corona was decidedly less bright than in 1898, and a much smaller number of rings is seen in the photographs. The three brightest rings are at wave-lengths 5303.7, 4231.3 and 3987.0, and it may be noted that these were also the brightest in the eclipses of 1893, 1896 and 1898. The conclusion that the different rings do not originate in the same gas, arrived at from a discussion of the photographs of 1898, has been confirmed.

A drawing is given to illustrate the fact that while the details of the green coronal ring are seen in the inner corona, they have no apparent relation to the positions of the great streamers or prominences. For an investigation of this nature the photographs taken with the prismatic camera of 20 feet focal length are specially valuable.

"On the Mathematical Theory of Errors of Judgment, with Special Reference to the Personal Equation." By Karl Pearson, F.R.S.

EDINBURGH.

Royal Society, July 1.—Prof. Chrystal in the chair.—Dr. Thomas Muir communicated a note on a proposition given by Jacobi in his *De Determinantibus functionalibus*, pointing out that the theorem in question was not so general as might at first reading seem to be implied.—Dr. R. H. Traquair read a paper on the distribution of fossil fishes in the Carboniferous rocks of the Edinburgh district. From a complete classification of the known forms, eighty-four in all, it was shown that the same genera and species were found in all the estuarine deposits, even though these were separated by marine limestones which contained a totally distinct set of fossil remains. There was no evidence of life zones. The forms were persistent and no evolutionary change could be detected. After the Millstone Grit there was no further appearance of the characteristic estuarine forms.—Dr. J. Beard, in a paper on the determination of sex in animal development, argued that the sex of the animal into which a given ovum developed was determined from the very beginning before the act of fertilisation. The argument was supported by an array of facts in embryology, such as the two kinds of oocytes which had been observed in certain animals.

July 15.—The Rev. Prof. Flint in the chair.—The chairman made a suitable reference to the sad loss which the Society and the wider world of science had suffered in the recent death of Prof. Tait, who had been their general secretary for more than twenty years.—The following prizes were then presented: the Gunning Victoria Jubilee prize to Dr. T. D. Anderson for his discoveries of new and variable stars; the Keith prize to Dr. James Burgess, C.I.E., for his paper on the definite integral

$\sqrt{\frac{2}{\pi}} \int_0^t e^{-t^2} dt$ with extended tables of values; and the Mak-

dougall-Brisbane prize to Dr. R. H. Traquair for his report on fossil fishes collected by the Geological Survey in the Upper Silurian rocks of Scotland.—Mr. C. Tweedie communicated a paper on the general form of the involutive one-one quadric transformation in a plane.—In a supplementary report on the fossil fishes from the Silurian rocks of the south of Scotland, Dr. Traquair announced some new anatomical features which he had discovered in these fish remains. Thus in some specimens of *Cœlolepidae*, two dark spots were found probably representing the position of the eyes; and in one specimen of *Lasanius problematicus*, vertical angulated lines were seen which might very reasonably be regarded as the remains of body muscle. Nearly perfect specimens of *Ateleaspis tessellata* show this remarkable genus to have close affinity to *Cephalaspis*, having two orbits on the top of the head, a small dorsal fin, and a

heterocercal non-bilobate caudal. The cephalic shield is, however, still without cornua.—Mr. Thomas Heath exhibited the photographs of the corona which he had taken during the total eclipse of May 28, 1900. The character of the corona was well marked in all; but from comparison with drawings taken by skilled draughtsmen it appeared that the outlying parts of the corona were not shown in the photographs. This might be due to the brightness of the sky consequent on the eclipse being one of short duration, or to the possible lack of actinic rays in these outlying regions.—Drs. D. Hepburn and D. Waterston read a paper on the true shape, relation and structure of the alimentary viscera of the common porpoise as displayed by the formal method. The animal on which the observations were made was an adult male, captured in fishing nets nearly eight months ago. It was carefully preserved within twenty-four hours of its capture, so that the organs retained their natural shapes and positions, while the various tissues were suitably “fixed” for microscopic examination. The authors have established, among other novel results, the presence of a peritoneal pelvic cavity which was not formerly recorded and which, from its relations to the vertebral column, provides a key to the subdivision of that part formerly called lumbosacral into lumbar and sacral sections. They have also revised the homologies of the multi-chambered stomach and placed them upon a more accurate footing; and similarly as regards the duodenum and intestine. The microscopic structure of the alimentary viscera was likewise examined under favourable conditions. The authors also report the presence of the tape-worm, *Bothriocephalus latus*, not hitherto recorded for marine animals.—Dr. A. T. Masterman communicated a paper on the central plexus of *Cephalodiscus dodecalophus*, M.I.

PARIS.

Academy of Sciences, July 22.—M. Fouqué in the chair.—The president announced to the Academy the death of M. de Lacaze-Duthiers, member of the section of zoology.—Remarks by M. Boussinesq on his work on the analytical theory of heat.—On the acidity of certain animal secretions, by M. Berthelot. In this study of acidity five indicators were employed—methyl orange, dimethylamidoazobenzene, red alizarine-sulphonate, litmus and phenolphthalein. Comparative determinations with these indicators were made of the acidity of the gastric juice, saliva and of urine.—Some observations made with uranium at very low temperatures, by M. Henri Becquerel. It was shown four years ago that between $+100^{\circ}$ and -20° C. there was no notable variation in the radiation from uranium, and in the present communication the intensity of this radiation is found to be practically constant at temperatures down to that of boiling liquid oxygen.—On the law of pressures in cannon, by M. E. Vallier.—New nebulae discovered at the Observatory of Paris, by M. G. Bigourdan. Details of the positions and appearance of twenty-three new nebulae.—On the Hermitian, by M. Léon Autonne. The name “Hermitian” is suggested instead of the “definite form” of Loewy, and the properties of these functions are summarised.—On an application of potential functions to the theory of elasticity, by MM. Eugène and François Cosserat.—On the dielectric cohesion of gases; the influence of the walls, by M. E. Bouty. An experimental study of the disturbances produced by the walls of the vessel containing the gas under examination shows that the critical phenomenon, that is the point at which the discharge commences to take place, is altogether independent of the material of the walls. The action of the latter is indirect, in so far as it modifies in a more or less irregular manner the field in which the gaseous mass stands.—Gratings obtained by the photography of rigorously achromatic fringes, by M. G. Meslin.—On the nature of the X-rays, by M. Jules Semenov. From the experiments described the author concludes that the X-rays represent directions of transmission, by means of the ether, of electrical vibrations. These vibrations communicate themselves to all bodies which they meet in their course. When these bodies are charged with electricity and are protected against discharge by convection, they lose their charge by radiation.—The action of hypophosphorous acid upon acetone, by M. C. Marie. By the interaction of acetone and hypophosphorous acid two new crystallisable acids are obtained, the constitution of which is not yet determined.—The preparation of pure oxide of cerium, by M. Jean Stebba. By the use of electrolysis as a means of oxidation, the method of Wyruboff and Verneuil is rendered more rapid. The oxide of cerium thus purified

from other metals may have a distinct colour, but becomes snow white on completely eliminating the last traces of nitrogen.—The thermal study of the solid hydrates of soda, by M. de Forcrand.—The action of copper hydrate upon solutions of metallic salts, by M. A. Mailhe. With solutions of several metallic chlorides and bromides, copper hydrate gives a mixed basic salt.—The action of silver upon hydrobromic acid and the inverse reaction, by M. Jouniaux. The results obtained were generally parallel with those previously obtained with hydrochloric acid and silver, the value for the heat of reaction calculated from the equilibrium pressures at various temperatures being in practical agreement with the direct determinations of Berthelot.—The oxidation of propylglycol by *Mycoderma aceti*, by M. Andre Kling. The oxidising action of *Mycoderma aceti* upon propylglycol resembles that of the sorbose bacterium, the acetol, $\text{CH}_3\text{CO}\cdot\text{CH}_2\text{OH}$, being produced in both cases.—The action of the pyridine bases upon the tetrahalogen derivatives of benzoquinones, by M. Henri Imbert.—On the chlorides and bromides of the supposed binaphthylene-glycol, by M. R. Fosse.—The action of gaseous ammonia upon the chlorhydrates of fatty amines, by M. Felix Bidet.—On some new vegetable species of Madagascar, by M. E. Drake del Castillo.—Histological researches upon the sporulation of the Schizosaccharomycetes, by M. A. Guilliermond.—On the intracellular diastases of the Amœba, by M. H. Mouton.—Light from the phosphorescent bacilli of the Baltic, by M. J. Tarchanoff.—Electrical stimulation produced by two waves inverse to each other, by M. Georges Weiss.—On the yield of bread from flour, by M. Balland.—The utilisation of wine residues and wines useless through disease as manure, by M. F. Garrigou. The residues left after the distillation of wine, together with large quantities of wine spoilt through disease, are at present discharged into drains and rivers. In this way vast amounts of substances of considerable manurial value are wasted, and in the present paper methods are suggested for utilising these materials.

CONTENTS.

PAGE

Speculative Biology. By J. A. T.	321
A Philosopher on Evolution	323
Coal Mining	324
Our Book Shelf:—	
Thorndike: “The Human Nature Club”; Binet: “Psychology of Reasoning.”—A. E. T.	325
Herbertson: “Outlines of Physiography. An Introduction to the Study of the Earth”	325
Selous: “Bird Watching”	325
Letter to the Editor:—	
History as a Science.—J. S. Stuart-Glennie	326
The Congress on Tuberculosis	327
Position and Prospects of Electrochemical Industries.	329
Miss Eleanor A. Ormerod. By W. F. K.	330
Notes (Illustrated.)	330
Our Astronomical Column:—	
Astronomical Occurrences in August	335
The Paris Observatory in 1900	335
Photography by the Light of Venus	336
New Nebulae	336
The Crystallisation of Salt Solutions. (With Diagrams.) By Dr. H. M. Dawson	336
Boomerangs. (With Diagrams.) By Gilbert T. Walker	338
The International Seismological Conference at Strassburg. By Dr. F. Omori	340
University and Educational Intelligence	341
Scientific Serial	341
Societies and Academies (With Diagrams.)	341